DPM 6060

ISOCYANATES AND EMPLOYEE SAFETY

EVALUATION OF THE INSTAPAK SYSTEM

Old Sherman Turnpike, Danbury, Connecticut 06810

Isocyanates are increasingly coming under close examination in regard to employee safety and health. The concern of employers about worker exposure to isocyanates is commendable but misinterpretation of technical facts often leads to confusion rather than a clear understanding.

For example, there is justified concern over the potential exposure of workers to TDI and even MDI (a special diisocyanate used to make products like shoe soles; not to be confused with CRUDE MDI). Employers sometimes assume that the potential for undue isocyanate exposure from TDI or MDI may also occur with INSTAPAK foam-in-place system. Such is not the case, but an explanation is needed in order to understand why.

Both TDI and MDI are relatively volatile isocyanates whose use can easily generate isocyanate vapor levels that are higher than should be allowed in a work atmosphere.

INSTAPAK Component A is a polymeric isocyanate of very low volatility and vapor pressure (less than .001 mm Hg at 25 C). Because of its low vapor pressure, INSTAPAK Component A, even without Component B, could be dispensed without producing a vapor concentration as high as the upper limit of safe exposure levels. But the Instapak system doesn't rest on this possibility. Rather, what happens in actual use of the system is that the polymeric isocyanate is dispensed only along with resin (the Component B) with which it begins to react instantaneously. This instant reaction totally destroys any volatility of the isocyanate. Numerous tests have been made by INSTAPAK, independent laboratories and INSTAPAK customers all of which tests confirm that in actual use, the concentration of isocyanate from INSTAPAK systems is only a fraction of the lowest level considered acceptable for worker exposure.

Among the many tests of the INSTAPAK system was a plant evaluation of the system by Dr. John M. Peters, M.D., of the Harvard School of Public Health. His studies were done for and reported to Dr. David C. Marshall, M.D., of Sanders Associates, a Nashua, New Hampshire based firm engaged in the manufacture of computer peripherals. The following is a synopsis of the report. (A copy of the original is available on request from INSTAPAK).

DR. PETERS' REPORT - SYNOPSIS

The evaluation consisted of air samplings of the packaging areas and physiological testing of the individuals involved with the Instapak installation - both monitored on a day long basis.

AIR SAMPLINGS

The acceptable amounts of Isocyanate present in an air sample is expressed in a threshold limit value (TLV) of parts per million (PPM). The TLV in Massachusetts is 0.01 ppm while the American Conference of Government Industrial Health and OSHA set it at 0.02 ppm.

Nine air samples taken thru out the day showed that Isocyanate concentrations never exceeded .005 ppm or 50% of the acceptable level in Massachusetts. The average concentration of the nine tests was .0018 ppm.

PHYSIOLOGICAL TESTS

The testing for possible effect of the Isocyanate on individuals involved measurement of the quantity of the exhaled breath from each of the seven workers involved in the beginning and at the end of the day. A significant decrease in capacity would be indicative of Isocyanate effect.

Four workers showed reductions in capacity and three showed increases. The degree of differences was so small that none of the changes was deemed to be statistically significant. Of the two workers most heavily exposed one showed a small decrease in capacity and the other a small increase.

CONCLUSION

On the basis of air sampling and monitoring of workers, it was concluded that the Instapak System caused no problems related to Isocyanate.

YORK RESEARCH CORPORATION - EVALUATION

Another of the tests performed was done by an independent laboratory (York Research Corporation) for INSTAPAK. In the case of that test the vapors within a box in which foam was being formed were anlayzed for isocyanate content. The isocyanate vapor concentration in this exaggerated atmosphere reached .014 ppm. Even this is less than the current OSHA standard. It is higher than the new limits that are expected to be adopted and a higher than desirable exposure level, but, of course, the value does not represent an exposure level since it was demonstrated only in a box, not in an operator's breathing zone. The test shows how high one could force the vapor concentration to go but it confirms many other tests wherein, in an actual operator's work area (breathing zone) the volatility of the isocyanate and the foam system is too low to make any hazardous vapor level development possible.

The U.S. Air Force is a user of INSTAPAK system throughout the world and has performed isocyanate vapor tests at one of their INSTAPAK foam-in-place packaging installations. They confirmed that no measurable level of isocyanate vapors were produced and that the system does not create any health hazard.

In an extensive test of an INSTAPAK system at a military defense depot the U.S. Army Environmental Hygiene Agency analyzed 35 samples of the air in the packaging building. The 25 of these that were from the employees' breathing zone had an average of 0.00144 ppm with a maximum of 0.005 ppm. The other samples from the general atmosphere averaged only 0.000825 ppm with a maximum of 0.002 ppm. No special ventilation exists in the packaging area. The report concludes, of course, that there is no health hazard from the foam-in-place packaging. This report does caution that some foam-in-place systems might contain some TDI and, if so, could be hazardous.

Instapak can provide, on request, copies of some of the reports described above. Actually, many other tests have been run; by INSTAPAK chemists, by the British Government, by TNO (a Dutch National Research Laboratory in Delft, Holland), and by a number of large industrial corporations who have qualified analytical personnel and industrial hygienists. Although such reports are private and not available for general publication and distribution, INSTAPAK can testify to the fact that without exception these reports all confirm that the INSTAPAK foam-in-place system does not create isocyanate vapor levels that exceed (actually not even approach) the maximum levels recommended for future adoption by NIOSH or currently in effect by OSHA.